

Escanaba, Michigan, 2d.—An aurora of variable brilliancy was observed from 6.30 to 9.15 p. m. Occasional beams appeared in the northeastern sky, converging to a point near the zenith.

Saint Vincent, Minnesota, 2d.—Auroral beams were visible during the early evening, but were soon obscured by clouds.

Springfield, Illinois, 2d.—At 8.30 p. m. a faint aurora was observed consisting of a diffuse rose colored light.

Fort Shaw, Montana, 2d.—A faint aurora was visible from 8 p. m. until the morning of the 3d.

Lewiston, Idaho, 2d.—An aurora was seen here from 8.10 to 10.30 p. m., extending over about 40° of the northern horizon.

Dayton, Washington territory, 2d.—A pale green auroral light, resembling the morning twilight, was visible from 6.45 to 11 p. m.

Port Angeles, Washington Territory, 2d.—A faint aurora, resembling the morning dawn, was visible in the northern sky from 6 to 9.30 p. m.

Other auroral displays were reported on the various dates as follows:

3d.—Mount Washington, New Hampshire; New Haven, Connecticut; Milwaukee, Wisconsin; Dubuque, Iowa; Fort Totten, Dakota; La Crosse, Wisconsin.

6th.—Marquette, Michigan; Duluth, Minnesota.

13th and 18th.—Boston, Massachusetts.

19th.—Block Island, Rhode Island; Oswego, New York.

21st.—Saint Vincent and Moorhead, Minnesota; Fort Totten, Dakota.

22d.—Boston, Massachusetts; Kitty Hawk, North Carolina; Marquette, Michigan; Milwaukee, Wisconsin; Saint Vincent, Minnesota; Fort Bennett and Yankton, Dakota.

27th.—Milwaukee, Wisconsin.

29th.—Logansport, Indiana.

30th.—Mount Washington, New Hampshire.

ATMOSPHERIC ELECTRICITY INTERRUPTING TELEGRAPHIC COMMUNICATION.

Leavenworth, Kansas.—The telegraph wires were affected by atmospheric electricity at this place, and at points eastward, on the 21st.

Portsmouth, North Carolina, 2d.—The working of the telegraph line was slightly disturbed at 8.30 p. m. of this date, being probably due to the influence of the aurora which was visible at that time.

THUNDER-STORMS.

Thunder-storms were reported in the various states and territories on the following dates:

Alabama.—22d, 26th.

Arkansas.—5th, 9th, 10th, 19th, 20th, 21st, 25th, 26th.

Colorado.—4th.

Florida.—26th.

Illinois.—4th, 5th, 7th to 10th, 20th, 21st, 22d, 25th, 26th.

Indiana.—5th, 8th, 9th, 20th, 21st, 25th, 26th.

Indian Territory.—21st.

Iowa.—4th, 5th, 8th, 9th, 20th, 21st, 24th, 25th.

Kansas.—4th, 5th, 8th, 21st, 25th.

Kentucky.—21st, 25th, 26th.

Louisiana.—21st, 26th.

Maine.—30th.

Michigan.—5th, 8th, 9th, 11th, 20th, 21st, 25th, 26th.

Minnesota.—5th, 25th.

Mississippi.—21st, 22d, 24th, 25th.

Missouri.—5th, 7th, 8th, 9th, 20th, 21st, 25th.

Nebraska.—4th, 5th, 8th, 25th.

New Hampshire.—9th.

New Jersey.—10th, 30th.

New York.—9th, 11th, 21st, 22d.

Ohio.—8th, 9th, 20th, 21st, 22d.

Pennsylvania.—9th, 21st.

Rhode Island.—1st.

Tennessee.—5th, 8th, 9th, 20th, 21st, 22d, 25th.

Texas.—7th to 10th, 18th, 19th, 21st, 22d, 24th, 25th, 26th.

Utah.—23d.

Vermont.—9th, 12th.

Washington.—24th.

Wisconsin.—4th, 5th, 7th, 8th, 9th, 20th, 21st, 25th, 26th, 29th.

Wyoming.—3d.

At Cambridge, Lamoille county, Vermont, during the storm of the 12th, a barn was struck by lightning and burned, resulting in a loss of \$8,000.

OPTICAL PHENOMENA.

SOLAR HALOS.

Solar halos have been observed in the various states and territories on the following dates:

Arkansas.—2d, 7th, 8th, 9th, 19th, 20th.

California.—1st, 2d, 4th, 5th, 15th, 16th, 20th, 21st, 27th, 28th.

Dakota.—4th, 7th, 8th, 9th, 19th, 21st, 25th.

Florida.—3d, 22d.

Illinois.—7th, 9th, 13th, 19th, 27th, 28th, 29th.

Indiana.—26th, 27th, 28th.

Iowa.—3d, 8th, 19th, 29th.

Kansas.—8th, 13th, 24th to 27th, 29th.

Kentucky.—11th, 27th, 28th, 29th.

Maine.—10th.

Massachusetts.—2d, 6th, 8th, 13th, 15th, 17th, 20th, 22d.

Michigan.—14th, 22d.

Minnesota.—26th, 27th.

Mississippi.—2d, 16th, 19th.

Montana.—25th.

Nebraska.—11th.

New Hampshire.—20th.

New Jersey.—21st.

New York.—29th.

North Carolina.—4th, 9th, 18th, 30th.

Ohio.—5th, 7th, 12th, 13th, 29th.

Tennessee.—5th, 7th, 10th, 15th, 19th, 23d, 26th.

Texas.—15th.

Utah.—4th to 7th, 17th, 18th.

Vermont.—19th, 22d.

Virginia.—15th, 24th.

Wisconsin.—2d, 14th, 26th, 27th.

LUNAR HALOS.

Lunar halos have been observed in the various states and territories on the following dates:

Alabama.—8th, 9th, 10th, 13th, 15th, 17th.

Arizona.—5th.

Arkansas.—4th, 6th, 8th, 10th, 12th, 13th.

California.—6th, 8th, 17th.

Colorado.—8th, 10th, 21st, 22d.

Dakota.—5th, 7th, 8th, 9th, 13th, 17th, 19th, 21st, 25th.

District of Columbia.—7th.

Florida.—8th to 12th, 14th to 17th.

Georgia.—5th, 8th, 10th, 11th, 13th, 19th.

Idaho.—12th, 16th, 17th.

Illinois.—2d, 8th, 9th, 10th, 19th, 29th.

Indiana.—5th, 8th, 10th, 11th, 12th, 16th, 18th, 20th.

Iowa.—7th, 8th, 12th, 14th, 18th.

Kansas.—6th, 7th, 8th, 13th, 18th, 19th.

Kentucky.—11th, 20th.

Louisiana.—16th.

Maine.—5th, 13th.

Massachusetts.—8th, 20th.

Michigan.—3d, 8th, 9th, 13th, 14th, 18th, 20th.

Minnesota.—5th, 6th, 7th, 9th, 10th.

Missouri.—8th, 10th, 14th.

Montana.—14th, 15th.

Nebraska.—1st, 6th, 8th.

Nevada.—5th.

New Hampshire.—11th.
New Jersey.—9th, 10th, 15th.
New York.—5th, 7th, 8th, 19th, 20th, 25th.
North Carolina.—5th, 7th to 11th, 13th, 14th, 15th.
Ohio.—8th to 11th, 13th, 19th, 20th, 22d.
Oregon.—9th, 10th, 16th.
Pennsylvania.—5th, 9th, 11th.
South Carolina.—11th, 12th, 14th, 15th.
Tennessee.—5th, 7th to 10th.
Texas.—4th, 5th, 6th, 9th to 13th.
Utah.—8th, 19th.
Vermont.—15th.
Virginia.—7th to 10th, 13th, 15th.
Washington Territory.—6th, 7th, 8th, 11th, 12th, 17th.
Wisconsin.—7th, 8th, 9th, 14th.
Wyoming.—19th.

MIRAGES.

Portsmouth, North Carolina, 13th.—Portions of Hyde county, from twenty to twenty-five miles distant, and not ordinarily visible from this place, were plainly seen on this date, apparently elevated above the horizon.

Mirages were also observed at Indianola, Texas, on the 14th, 16th, 27th, 28th; at Salina, Kansas, from the 27th to 30th; and at Pretty Prairie, Kansas, on the 30th.

Captain Robert B. Quick, of the s. s. "Lone Star," from N. 38° 52', W. 74° 08' on the 22d, to N. 25° 27', W. 80° 03' on the 26th, reports that every light and object sighted were seen twice the distance at which they were usually visible. Hatteras light was seen a distance of thirty-five miles; objects on land, twenty miles; Frying Pan Lightship, twenty miles; and Canaveral Light, over thirty miles.

MISCELLANEOUS PHENOMENA.

A peculiar appearance of the sky preceding sunrise and following sunset has been reported by observers in nearly every part of the United States. This phenomenon has also been extensively observed in other countries.

Mr. A. C. Banyard, in an article published in "Knowledge," of December 7, 1883, relative to its appearance in Europe, Asia, and Africa, ascribes the cause to meteoric dust.

The following reports have been received from the regular and voluntary observers of the Signal Service in the various states and territories:

Alabama.—Auburn, Lee county, 27th: the past week has been characterized by wonderfully brilliant and beautiful sunsets.

California.—Oakwood, San Diego county: from the 24th to 30th the sun was surrounded by a whitish glare during the day, and the sunset displays were of more or less intensity. The same conditions were observed here on October 18th.

Hydesville, Humboldt county: the mornings and evenings, from the 24th to 30th, were characterized by very brilliant twilight. In the morning the sky became red about an hour, or an hour and a half, before sunrise, and gradually faded as the sun arose. The evening twilights were more remarkable than those of the mornings. The sky began to grow red just after sunset, the color increasing in brilliancy for about an hour. On the evening of the 24th the southern sky was so bright as to resemble the light from a great fire.

Oakland, Alameda county: on the morning of the 25th, when the twilight first appeared, it gave out in the eastern sky a luminous, silvery color, gradually fading toward the horizon. As the sun came up the light rose nearer to the zenith, changing to a reddish pink and forming a crescent, beneath which was a pale green color of an apparent diameter of 60°. As the sun arose, the colors changed to a yellowish-red. The evening twilight was one of the most remarkable displays ever witnessed at this place. The succeeding days—from the 26th to 30th—were much the same, the crimson and lurid colors continuing long after sunset and before sunrise.

Salinas City, Monterey county, 30th: the red sunsets, so fre-

quently commented upon by the newspapers, have been noticeable here, also, with the same splendor as observed elsewhere. The sky was brightest at about ten or fifteen minutes after sunset, when everything was brilliantly lighted up by it.

Poway, San Diego county: a very brilliant crimson glow in the southwestern sky was observed here for several evenings near the close of the month.

Colorado.—Pueblo, Pueblo county, 30th: the eastern sky at sunrise, and just before, has been remarkably brilliant with a variety of colors. At sunset the display of rich golden colors over the mountain tops were so striking in their resemblance to a vast conflagration in the valley beyond as to occasion much comment.

Fort Collins, Larimer county: brilliant sunsets were observed here on the evenings from the 24th to 27th, and a very unusual appearance of the eastern sky preceded the rising sun on those dates.

Connecticut.—Watertown, New London county, 28th: very remarkable sunsets were observed here for several evenings preceding this date, the glow frequently growing brighter for some time after sunset. The sunset of the 28th exceeded in brilliancy any previously observed, the light resembling the appearance of a large fire in the distance.

Dakota.—Rapid City, Teton county, 30th: the western sky at sunset of this date was of a very bright reddish color.

Huron, Beadle county: just before sunrise of the 28th, and after sunset of that date, a peculiar appearance of the sky was very noticeable here.

Florida.—Archer, Alachua county: very brilliant sunsets were observed here on the 15th and from the 22d to 30th.

Georgia.—Andersonville, Sumter county: at sunset of the 27th the western sky was of a bright orange color, extending from the horizon to an altitude of about 30°.

Forsyth, Monroe county: throughout the month the sky before and after sunset presented a beautiful appearance. On the evening of the 29th, just after sunset, streamers shot upward from the west, and the sky in that quarter resembled the aurora borealis.

Illinois.—Morrison, Whiteside county: lurid sunsets were observed here on the 26th, 27th, and 28th; and lurid sunrises on the 27th and 28th.

Swanwick, Perry county: a very remarkable sunset was observed here on the 27th. The sky was colored with various shades of red, which continued until darkness ensued. The same phenomenon was observed on several evenings and also before sunrise.

Springfield: peculiar colors were noticed in the sky accompanying sunrise and sunset from the 26th to 28th.

Indiana.—Vevay, Switzerland county: a beautiful golden sunset was observed here on the evening of the 27th.

Griffin Station, Rush county: the evenings of the 27th and 28th were noted for brilliant sunsets, that on the last mentioned date being especially bright.

Sunman, Ripley county: on the 28th the sky was overspread with a crimson glow resembling a bright aurora. The same phenomenon was observed on several evenings following.

Laconia, Harrison county, 30th: very brilliantly illuminated sunsets and sunrises were almost daily observed during the last three weeks.

Iowa.—Des Moines: on the 27th and 28th a remarkable redness was observed over the entire eastern sky about one hour before sunrise. The same was observed on the evenings of the same dates about one hour after sunset.

Manchester, Delaware county: three sunsets were observed here, viz: on the 26th, 27th, and 28th, which were remarkable on account of the brilliant colors in the western sky.

Humboldt, Humboldt county: before sunrise and after sunset on the 26th, 27th, and 28th, the sky assumed unusual brightness.

Muscatine, Muscatine county: remarkably bright sunsets were observed here on the 24th, 26th, 27th, and 28th.

Kansas.—Manhattan, Riley county: after sunset on the